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10/820,856

04/09/2004

Min-Lung Huang

HUAN3261/EM

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BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314

EXAMINER

BRYANT, DELORIS S

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 05/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/820,856

Applicant(s)

HUANG, MIN-LUNG

Examiner

Deloris Bryant

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 8-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Species I in the reply filed on April 7, 2006 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Mis et al (US 5,767,010). Mis discloses an under bump metallization structure applicable to be disposed on bonding pads of a semiconductor wafer, wherein a passivation layer covers the wafer and exposes the bonding pads, the under bump metallization structure comprising (see Fig. 6): an adhesive layer (28) formed on the bonding pads (24); a first barrier layer (30) disposed on the adhesive layer (28); a wetting layer (32) formed on the first barrier layer (30); and a second barrier layer (34') disposed on the wetting layer (32), wherein a material of the second barrier comprises tin and copper (col. 5, lns. 40-66).
4. Regarding claim 2, Mis discloses wherein the quantity of the tin is smaller than the quantity of the copper (col. 5, lns 45-66).

Art Unit: 2813

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mis et al (US 5,767,010) in view of Chen et al (US 6,819,002). Mis discloses all claim limitations as set forth above in claim 1. However, Mis fails to disclose that the first barrier layer is a nickel-vanadium layer (claim 3) or that the wetting layer is a copper layer (claim 4) or the wetting layer is a nickel layer (claim 5). Chen teaches that the first barrier layer (Fig. 2A; 224) is a nickel-vanadium layer (col. 3, lns 57-58). Chen also teaches that the wetting layer (226) can be either a copper layer or a nickel layer (col. 3, lns. 65-67). It would have been obvious to one skilled in the art at the time of the applicant's invention to incorporate the teachings of Chen with the disclosure of Mis. One would have been motivated to so modify Mis' disclosure with Chen's choice of

materials for the barrier layer for preventing the diffusion of atoms from a layer above the barrier layer to a layer below the barrier layer and vice versa. Choosing Chen's choice of material for the wetting layer is for the bonding strength of the material.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mis et al (US 5,767,010) in view of Chen et al (US 2003/0104683). Mis discloses all claim limitations as set forth above in claim 1. Mis, however, fails to disclose that the wetting layer is a titanium layer. Chen teaches that the wetting layer is a titanium layer (pg. 1, para 0007).). It would have been obvious to one skilled in the art at the time of the applicant's invention to incorporate the teachings of Chen with the disclosure of Mis. One would have been motivated to so modify Mis' disclosure with Chen's choice of materials for the wetting layer for the bonding strength of the material.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mis et al (US 5,767,010) in view of Chen et al (US 6,819,002). Mis disclose the device in accordance with claim 1 as explained above, and Chen teaches wherein the second barrier layer has a specific thickness. Chen does not specifically disclose that thickness of the second barrier layer is a range from about 50 μm to about 80 μm .

These claims are *prima facie* obvious without a showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art

Art Unit: 2813

ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art in general conditions is obvious).

In this case, there exists no evidence of record that the thickness of the second barrier layer having a range from about 50 μm to about 80 μm . provides unexpected results in the UBM layers produced. One of ordinary skill in the art would be motivated to optimize the thickness of the second barrier layer to a range from about 50 μm to about 80 μm . to provide a layer thick enough to prevent unwanted reaction between the wetting layer and the solder bump.

Conclusion


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Deloris Bryant whose telephone number is (571) 272-8670. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2813

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dsb


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800